Coastal Protection and Restoration Authority of Louisiana

State of Louisiana

Coastal Protection and Restoration Authority of Louisiana

Monitoring Plan

for

Mississippi River Sediment Delivery System – Bayou Dupont (BA-39)

State Project Number BA-39
Priority Project List 12

July 2013

Prepared by:
Danielle C. Richardi, Peter Hopkins P.E., and William M. Boshart

Coastal Protection and Restoration Authority of Louisiana
New Orleans Regional Office
CERM, Suite 309
2045 Lakeshore Drive
New Orleans, LA 70122

Monitoring Plan for Mississippi River Sediment Delivery System–Bayou Dupont (BA-39)
Priority Project List 12

The Coastal Protection and Restoration Authority of Louisiana (CPRA) and the United States Environmental Protection Agency (EPA) agree to carry out the terms of this monitoring plan for the Mississippi River Sediment Delivery System–Bayou Dupont (BA-39), in accordance with the Cooperative Agreement No. X7-96672301, dated August 8, 2008. Future funding for monitoring may be administered through alternative agreements. The cooperative agreement is included in the BA-39 Operations and Maintenance (O&M) Plan, along with the construction completion report, the project permits, and the O&M budget. The O&M plan and other documents pertaining to BA-39 can be accessed through CPRA's library, which is available through CPRA's website at *http://coastal.louisiana.gov/*.

As outlined in this plan, monitoring data will be collected using standardized data collection techniques and will be analyzed to determine whether the project is achieving the anticipated benefits. Operations, Maintenance and Monitoring (OM&M) reports will be generated every three years, or as directed by EPA, to present and interpret the data, and recommendations will be made when appropriate to adaptively manage the project.

Construction of the Mississippi River Sediment Delivery System–Bayou Dupont (BA-39) was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) enacted on November 29, 1990, as amended.

1. PROJECT DESCRIPTION, PURPOSE, GOALS, and FEATURES

Description

The Mississippi River Sediment Delivery System–Bayou Dupont (BA-39) project used sediment hydraulically dredged from the Mississippi River to build a marsh platform in an area that lies within a rapidly eroding and subsiding section of the Barataria Landbridge. Now converted to mostly open water, the degraded condition of marsh in this region is due to a combination of factors including subsidence, lack of riverine sediment input, (Baumann et al. 1984) and the alteration of hydrology resulting from the dredging of oil and gas canals (Sasser et al. 1986). Monitoring of this project is particularly important because it is the first CWPPRA project that has used sediment dredged from the Mississippi River for the purpose of creating marsh.

The BA-39 project area is located on the west bank of the Mississippi River in Jefferson and Plaquemines Parishes, approximately 3.7 miles northwest of the town of Myrtle Grove, LA (Figure 1). The project area is bordered on the east by the Plaquemines Parish flood protection levee and open water, to the north by Cheniere Traverse Bayou, and to the west and south by pipeline canals. The BA-39 project area is nested within the Naomi Outfall Management (BA-03c) project area. Information on this CWPPRA project that is sponsored by the National Resource Conservation Service (NRCS) can be accessed through CPRA's online library.

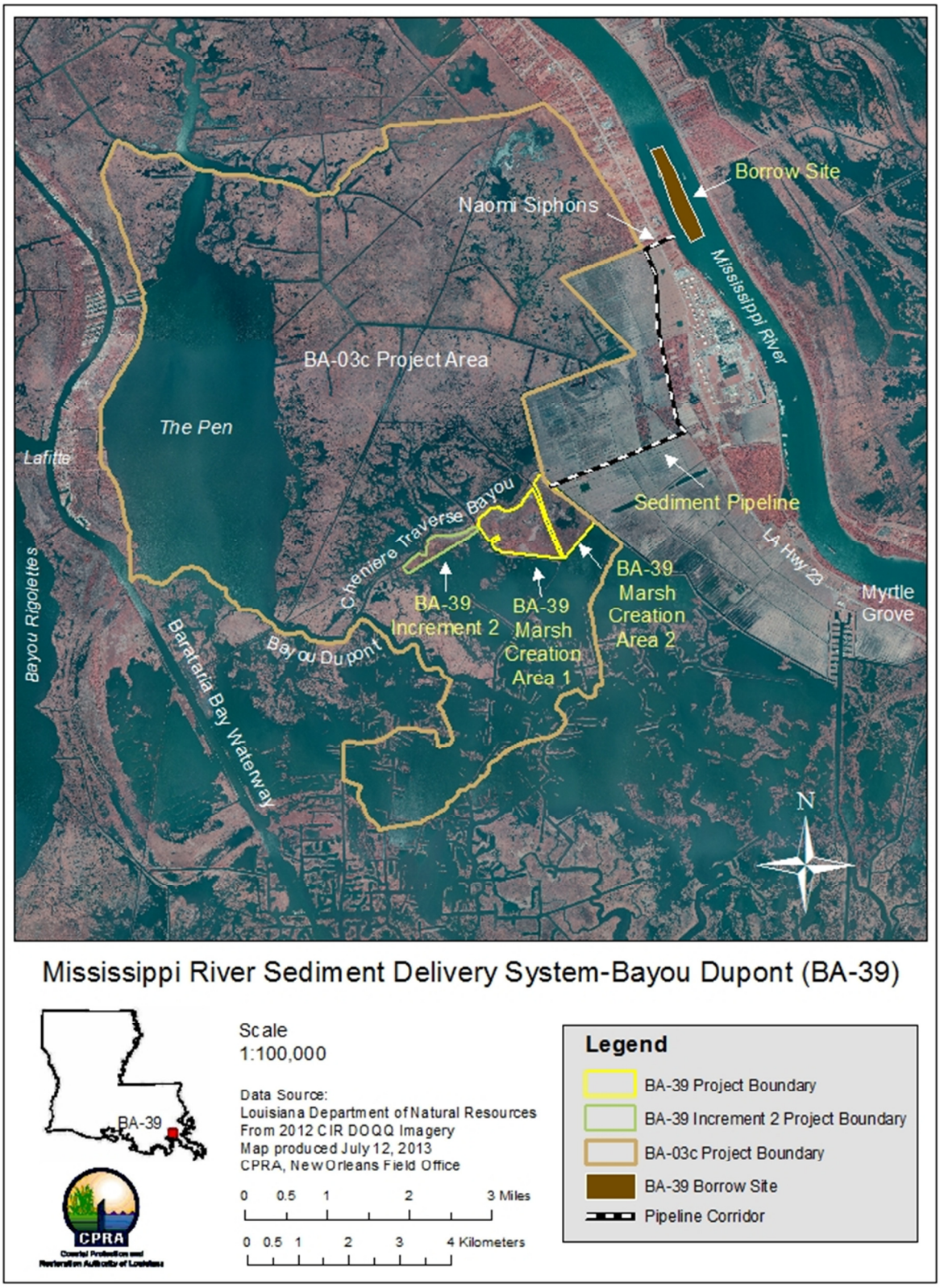

Figure 1. Mississippi River Sediment Delivery System–Bayou Dupont (BA-39) and BA-39 Increment 2 project areas and features.

Construction for BA-39 began in April 2009, with sediment delivery into the project area starting a few months later on November 11, 2009. The final day of sediment delivery was December 25, 2009, and project construction was officially completed on May 10, 2010. Sediment was pumped to approximately +2′ ± 0.3′ NAVD88 into both of the marsh creation cells (ABMB Engineers, Inc. 2011). Based on observations of nearby healthy natural marsh, an elevation of +1.3′ NAVD88 was determined to be ideal to provide the flooding conditions best-suited for sustaining healthy marsh vegetation in the project area. The as-built elevation should provide a marsh platform that supports healthy emergent marsh through most of the project's 20-year life, with a projected settlement at year 10 to +1.3′ NAVD88 and at year 20 to +1.2′ NAVD88 (Thompson 2007). Colonization and stabilization of the marsh platform by native vegetation was enhanced by plantings of approximately 21,000 *Spartina alterniflora* (smooth cordgrass) plugs and 5,000 *Paspalum vaginatum* (seashore paspalum) plugs between May 4, 2010, and June 3, 2010 (Faust 2010).

During construction, the sediment fill area of BA-39 was expanded to the west through the addition of Increment 2 (Figure 1). Increment 2 was sponsored by the National Oceanographic and Atmospheric Administration (NOAA) and was funded by the American Recovery and Reinvestment Act (ARRA) through a grant administered by NOAA. Additional funding was provided through the CWPPRA grant administered by EPA.

Purpose

The purpose of the BA-39 project is to create sustainable brackish emergent marsh in an area that was primarily open water and remnant brackish marsh through the use of sediments dredged from the Mississippi River. The anticipated benefits provided by the project include the creation of important wetland habitat and the enhancement of storm protection for inland areas. Additionally, this project will serve to demonstrate the feasibility of using sediment dredged from the Mississippi River to create sustainable marsh.

Goals

The goals of the BA-39 project are to restore/create approximately 372 acres and nourish approximately 99 acres of emergent marsh in an area that is currently mostly open water (USEPA, LDNR 2007).

The introduction and placement of sediments through the use of dedicated dredging is consistent with Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2012), specifically, the Barataria Marsh Creation Component.

Features

The project features covered by this monitoring plan are inclusive of and are identified as the Mississippi River Sediment Delivery System–Bayou Dupont (BA-39).

The as-built principal project features include the following:

- Approximately 484 acres of marsh fill (Marsh Creation Area 1 and Marsh Creation Area 2)
- Approximately 25,935 linear feet of containment dikes
- One 95-linear foot, 48-inch diameter casing that was left in place as a crossing under the New Orleans & Gulf Coast Railroad for future use
- One 194-linear foot, 48-inch diameter casing that was left in place under Highway 23 for future use
- Increment 2: approximately 84 acres of marsh fill
- Increment 2: approximately 6241 linear feet of containment dikes

Total acres of marsh fill: 568 acres
Total linear feet of containment dikes: 32,176 linear feet

2. ITEMS REQUIRING MONITORING

Monitoring for BA-39 includes three project-specific monitoring sites in the project area where data will be collected to measure project success, as based on project goals (Figure 2). Data collected from these sites will be compared to data from BA-03c project-specific stations and from Coast-wide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) sites surrounding the project area to compare characteristics between the created marsh and local, natural marsh. Monitoring is not being conducted in Increment 2, other than when specifically mentioned.

A. Land-Water Analysis

Land-water photography will be used in conjunction with topographic surveys of the project area to evaluate the project's success of creating a sustainable marsh platform. Land to water ratios in the project area will be determined using CRMS aerial photography (Z/I Imaging digital mapping camera) with 1-meter resolution. The photography will be georectified using standard operating procedures described in Steyer et al. (2000). The initial aerial photography was collected in 2012 and the final photography is tentatively scheduled for 2018, dependent on the scheduling of CRMS coastwide flights.

B. Elevation (Topographic Surveys)

Data from topographic surveys will be compared over time to measure if the dredged material is settling at the predicted rate and if the marsh platform is retaining an elevation that promotes healthy emergent marsh. Transects are spaced at intervals of 500 feet and points are taken approximately every 50 feet. Post-construction topographic surveys were conducted in 2010 (as-built) and 2011 for BA-39 and Increment 2 and will be conducted again in 2014 and 2016 for BA-39.

C. Vegetation

Vegetation data will be used to assess how the marsh platform is being colonized by emergent marsh vegetation and to compare the vegetation in the created marsh to local, natural emergent marsh. Surveys of marsh vegetation will be conducted at each of the three BA-39 monitoring sites following CRMS methodology (Folse et al. 2012). The sites contain ten replicate 2 m x 2 m stations located along a 288 m transect within a 200 m x 200 m square. Examples of data collected at these stations include total cover, species present, percent cover of each species, average height of each vegetation layer, and the depth of water on the marsh surface. Vegetation sampling was conducted in 2010 and 2011 and is scheduled again for 2015, 2018 and 2021. Vegetation was also surveyed at six stations in Increment 2 in 2010 and 2011 using funds provided through the ARRA grant.

D. Soil Properties

Soil data will be used to monitor changes in soil properties over time and to compare soil properties in the created marsh to those in local, natural marsh. Soil cores were collected and analyzed from each of the three BA-39 monitoring sites in 2010 and will be collected again in 2014 and 2019 following CRMS methodology (Folse et al. 2012). Soil properties analyzed include percent organic matter, soil pH, salinity (EC), bulk density, moisture, and wet/dry volume.

E. Rod Surface Elevation Tables (RSET)

Rod Surface Elevation Tables (RSET) will be used at each of the three BA-39 monitoring sites to measure precise changes in marsh surface elevation over time relative to a fixed datum (NAVD88). RSET data will be collected and analyzed bi-annually in the spring and fall from 2011–2020 following CRMS methodology (Folse et al. 2012).

F. Accretion

Vertical accretion data will be analyzed in conjunction with RSET data to provide rates of shallow subsidence at each of the three BA-39 monitoring sites. Vertical accretion above a feldspar marker horizon will be measured concurrently with RSET data collection in the spring and fall from 2011–2020 following CRMS methodology (Folse et al. 2012).

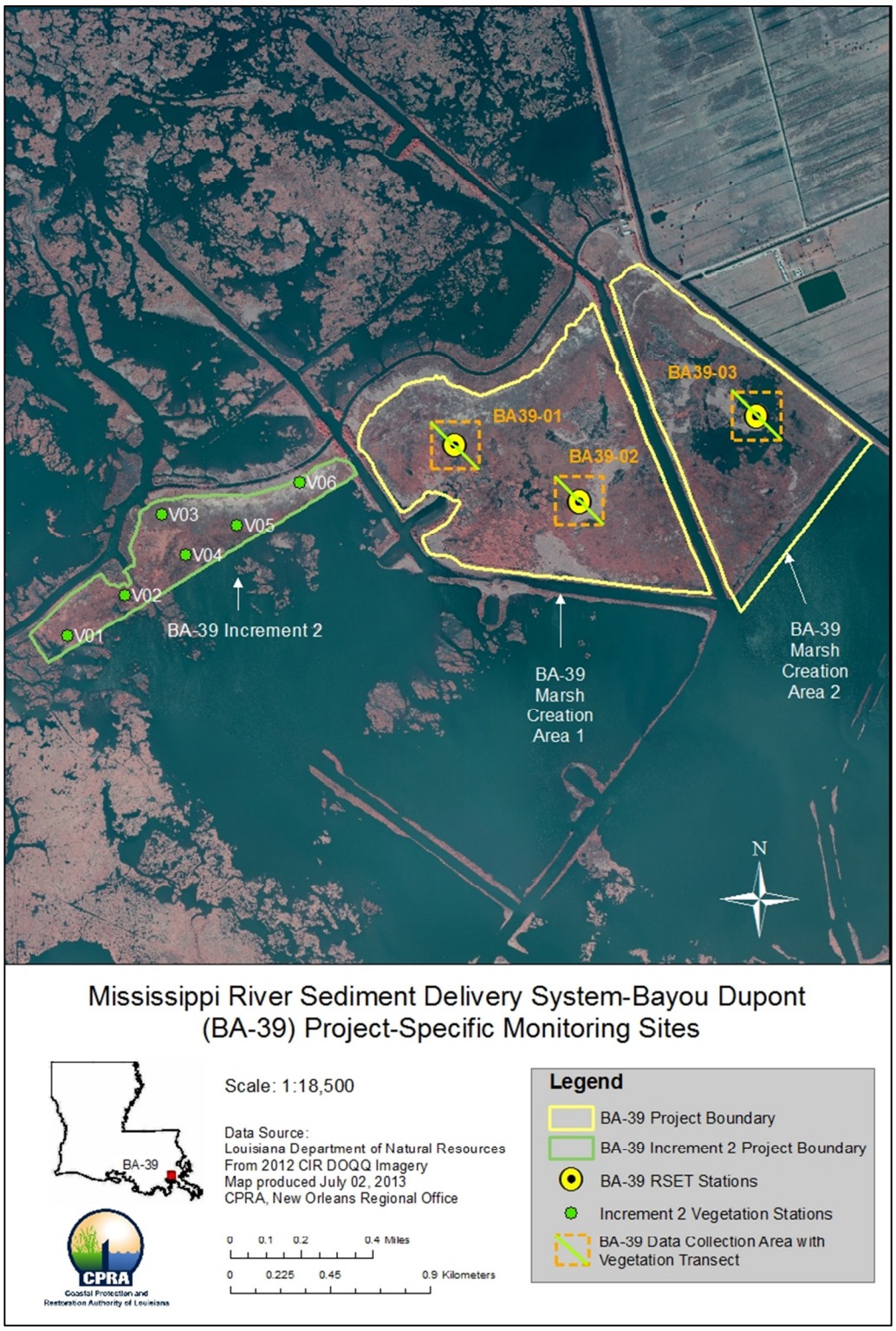

Figure 2. The Mississippi River Sediment Delivery System–Bayou Dupont (BA-39) and BA-39 Increment 2 project-specific monitoring sites. Approximate center of cells: Marsh Creation Area 1: 29°38'59"N and 90°0'57"W, Marsh Creation Area 2: 29°39'40"N and 90°0'26"W, Increment 2: 29°38'51"N and 90° 01'59"W.

3. MONITORING BUDGET

The cost associated with monitoring BA-39 for its twenty-year project life is summarized in the Operations, Maintenance and Monitoring (OM&M) budget in Appendix I. The budget includes the original monitoring schedule that was developed for BA-39 prior to project construction. The years listed for each monitoring element under Section 2: Items Requiring Monitoring are updated to reflect changes that have been made to the schedule since construction.

Costs for OM&M were combined into one budget for BA-39; therefore, a few operations and maintenance items listed in the budget are not addressed in the monitoring plan. These items include Survey-Borrow Area, Geotechnical Instrumentation for Monitoring Hydraulically Dredged Fill Material, and State O&M (annual maintenance inspections). Monitoring Site Installation, Construction, and Survey O&M cover the initial costs for building and surveying the monitoring stations. The line items USACE Administration and Federal S&A cover federal administrative costs.

4. RESPONSIBILITIES

A. CPRA will:

1. Coordinate and oversee all scientific data collection.

2. Ensure that all data go through quality control procedures and that land-water, vegetation, soil, RSET, and accretion data are entered into the public database.

3. Analyze the data and publish OM&M reports every three years, or as otherwise directed by EPA**.** If the data indicate that the project is not meeting its goals and objectives, adaptive management recommendations will be made to improve the response.

4. Review the monitoring plan and budget annually with the EPA to determine that the data being collected adequately evaluate the project.

B. EPA will:

1. Review the monitoring plan and budget annually to determine that the data being collected adequately evaluate the project.

2. Review OM&M reports.

5. REFERENCES

ABMB Engineers, Inc. 2011. Project Completion Report: Mississippi River Sediment Delivery System, Bayou Dupont, State Project No. BA-39. 15 pp. plus appendices.

Baumann, R.H., J.W. Day, and C.A. Miller. 1984. Mississippi deltaic wetland survival-sedimentation versus coastal submergence. *Science* 224: 1093–1095.

Coastal Protection and Restoration Authority of Louisiana. 2012. *Louisiana's Comprehensive Master Plan for a Sustainable Coast*. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

Faust. S. 2010. Bayou Dupont Vegetative Planting Project (BA-39) Project Completion Report. Louisiana Office of Coastal Protection and Restoration. Baton Rouge, LA. 2 pp.

Folse, T.M., J.L. West, M.K. Hymel, J.P. Troutman, L.A. Sharp, D.K. Weifenbach, T.E. McGinnis, L.B. Rodrigue, W.M. Boshart, D.C. Richardi, C.M. Miller, and W.B. Wood. 2008, revised 2012. A Standard Operating Procedures Manual for the Coast-wide Reference Monitoring System-*Wetlands*: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control. Louisiana Coastal Protection and Restoration Authority. Baton Rouge, LA. 207 pp.

Sasser, C.E., M.D. Dozier, and J.G. Gosselink. 1986. Spatial and temporal changes in Louisiana's Barataria Basin marshes, 1945–1980. *Environmental Management* 10 (5): 671–680.

Steyer, G.D., R.C. Raynie, D.L. Steller, D. Fuller, and E. Swenson. 2000. Quality management plan for the Coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open-file series no. 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division. 97 pp.

Thompson, W.C. 2007. Final Design Report: Mississippi River Sediment Delivery System-Bayou Dupont (BA-39). Louisiana Department of Natural Resources Coastal Engineering Division. Baton Rouge, LA. 37 pp. plus appendices.

U.S. Environmental Protection Agency and Louisiana Department of Natural Resources. 2007. Mississippi River Sediment Delivery System-Bayou Dupont (BA-39): Project Information Sheet for Wetland Value Assessment. 17 pp.

APPENDIX I

Operations, Maintenance and Monitoring (OM&M) Budget

Mississippi River Sediment Delivery System - Bayou Dupont BA-39																						
Federal Sponsor: EPA																						
Construction Completed : 2010																						
PPL 12																						
Current Approved OM&M Budget																						
Project Year	**YR 0**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**	**YR 6**	**YR 7**	**YR 8**	**YR 9**	**YR 10**	**YR 11**	**YR 12**	**YR 13**	**YR 14**	**YR 15**	**YR 16**	**YR 17**	**YR 18**	**YR 19**	**Project Life**	**Currently**
Fiscal Year	**FY2011**	**FY2012**	**FY2013**	**FY2014**	**FY2015**	**FY2016**	**FY2017**	**FY2018**	**FY2019**	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**FY2028**	**FY2029**	**FY2030**	**Budget**	**Funded**
State O&M	$6,809	$3,197	$5,612	$3,326	$5,267	$3,726	$3,529	$3,600	$4,442	$3,900	$3,777	$4,152	$3,930	$4,008	$4,089	$4,170	$4,254	$4,339	$4,426	$4,514	$85,067	$85,067
USACE Administration	$785	$801	$817	$834	$850	$867	$885	$902	$921	$939	$958	$977	$996	$1,016	$1,037	$1,057	$1,079	$1,100	$1,122	$1,145	$19,088	$19,088
Federal S&A	$6,809	$3,197	$5,612	$3,326	$5,267	$3,726	$3,529	$3,600	$4,442	$3,900	$3,777	$4,152	$3,930	$4,008	$4,089	$4,170	$4,254	$4,339	$4,426	$4,514	$85,067	$85,067
Total O&M	$14,403	$7,195	$12,041	$7,486	$11,384	$8,319	$7,943	$8,102	$9,805	$8,739	$8,512	$9,281	$8,856	$9,032	$9,215	$9,397	$9,587	$9,778	$9,974	$10,173	$189,222	$189,222
Biological & Engineering Monitoring																						
Aerial Photography			$14,167						$15,957												$30,124	$30,124
Survey - Project Area and Settlement Plates	$52,325		$54,495		$56,700																$163,520	$163,520
Survey - Borrow Area	$41,860																				$41,860	$41,860
Geotechncial Instrumentation for Monitoring Hydraulically Dredged Fill Material	$37,608																				$37,608	$37,608
Monitoring Site Installation, Construction, and Survey O&M	$36,628																				$36,628	$36,628
Vegetation Surveys	$7,849		$8,174			$8,674			$9,205			$9,769									$43,671	$43,671
Soil Samples	$4,252				$4,602					$5,086											$13,940	$13,940
RSET/Accretion	$1,125	$1,149	$1,172	$1,195	$1,219	$1,243	$1,268	$1,294	$1,319	$1,346											$12,330	$12,330
Total Monitoring	$181,647	$1,149	$78,008	$1,195	$62,521	$9,917	$1,268	$1,294	$26,481	$6,432	$0	$9,769	$0	$0	$0	$0	$0	$0	$0	$0	$379,681	$379,681
Total OM&M	$196,050	$8,344	$90,049	$8,681	$73,905	$18,236	$9,211	$9,396	$36,286	$15,171	$8,512	$19,050	$8,856	$9,032	$9,215	$9,397	$9,587	$9,778	$9,974	$10,173	$568,903	$568,903